

Claims

What is claimed is:

1. A computer readable medium having stored thereon a data structure comprising:
digitized audio; and

5 pause information that indicates at least one pause location within the digitized audio.

2. The computer readable medium of claim 1, wherein the digitized audio comprises digitized speech.

10 3. The computer readable medium of claim 1, wherein the at least one pause location is at a beginning of the digitized audio, an end of the digitized audio or both.

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4. The computer readable medium of claim 1, wherein the pause information comprises at least one pause type corresponding to the at least one pause location.

- 20 5. The computer readable medium of claim 4, wherein the at least one pause type comprises any of a group consisting of a word pause, a phrase pause, a sentence pause, a paragraph pause, a heading pause, a topic pause, a speaker pause, an end pause and an audio stream pause.

- 25 6. The computer readable medium of claim 1, wherein the pause information further comprises at least one tuple, each tuple of the at least one tuple uniquely corresponding to a single pause location of the at least one pause location, each tuple comprising:

a pause type corresponding to the single pause location; and
a pointer to the single pause location.

7. The computer readable medium of claim 1, wherein the pause information further comprises at least one tuple, each tuple of the at least one tuple uniquely corresponding to one or more pause

locations of the at least one pause location, each tuple comprising:

- a pause type corresponding to the one or more pause locations;
- at least one pointer to the one or more pause locations; and
- a length parameter indicating a number of pointers associated with the pause type.

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8. The computer readable medium of claim 1, wherein the pause information is appended to the digitized audio.

9. The computer readable medium of claim 1, wherein the pause information is interspersed
10 within the digitized audio.

10. The computer readable medium of claim 1, wherein the data structure further comprises:
a start pointer that points to a beginning of the digitized audio.

15 11. The computer readable medium of claim 1, wherein the data structure further comprises:
routing information used to convey the data structure to a target.

12. A method for marking pauses within digitized audio, the method comprising steps of:
identifying at least one pause location within the digitized audio; and
adding, to the digitized audio, pause information that indicates the at least one pause location
within the digitized audio.

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13. The method of claim 12, wherein the pause information comprises at least one pause type
corresponding to the at least one pause location.

- 10 14. The method of claim 13, wherein the at least one pause type comprises any of a group
consisting of a word pause, a phrase pause, a sentence pause, a paragraph pause, a heading pause, a
topic pause, a speaker pause, an end pause and an audio stream pause.

- 15 15. The method of claim 12, wherein the pause information comprises silence description
packets.

16. The method of claim 12, further comprising steps of:
deriving the digitized audio from text; and
analyzing the text to ascertain the at least one pause location.

- 20 17. The method of claim 16, further comprising a step of:
analyzing the text to determine at least one pause type corresponding to the at least one pause
location.

- 25 18. The method of claim 12, wherein the step of adding further comprises adding at least one
tuple to the digitized audio, wherein each tuple of the at least one tuple uniquely corresponds to a
single pause location of the at least one pause location, each tuple comprising:
a pause type corresponding to the single pause location; and

a pointer to the single pause location.

19. The method of claim 12, wherein the step of adding further comprises adding at least one tuple to the digitized audio, wherein each tuple of the at least one tuple uniquely corresponds to one
5 or more pause locations of the at least one pause, each tuple comprising:

a pause type corresponding to the one or more pause locations;
at least one pointer to the one or more pause locations; and
a length parameter indicating a number of pointers associated with the pause type.

10 20. The method of claim 12, wherein the step of adding further comprises appending the pause information to the digitized audio.

15 21. The method of claim 12, wherein the step of adding further comprises interspersing the pause information within the digitized audio.

22. The method of claim 12, further comprising steps of:
dividing the digitized audio and the pause information into packets; and
transmitting the packets to a decoder.

20 23. The method of claim 22, wherein, for each packet, pauses occur at a beginning of the packet, an ending of the packet or both.

24. A computer-readable medium having computer-executable instructions for performing the steps of claim 12.

25. A method for decoding digitized audio, wherein pause information has been added to the digitized audio, the method comprising steps of:

receiving the digitized audio;

providing reconstructed audio based on the digitized audio;

5 detecting a condition requiring at least temporary discontinuation of the reconstructed audio;

pausing provision of the reconstructed audio based on the pause information and in response to detecting the condition.

26. The method of claim 25, wherein the step of detecting further comprises detecting
10 impairment to continued receipt of the digitized audio.

27. The method of claim 25, wherein the step of detecting further comprises receiving a request to discontinue the reconstructed audio.

15 28. The method of claim 25, further comprising steps of:

determining that the condition is no longer valid; and

continuing provision of the reconstructed audio.

29. The method of claim 25, wherein the step of pausing further comprises pausing for a
20 predetermined period of time, the method further comprising a step of:

continuing provision of the reconstructed audio upon expiry of the predetermined period of time.

30. The method of claim 29, wherein the pause information comprises at least one pause type,
25 and length of the predetermined period of time is based on the at least one pause type.

31. The method of claim 25, further comprising a step of:

storing a predetermined amount of the digitized audio in a buffer prior to the step of providing the reconstructed audio,

wherein the reconstructed audio is based on the digitized audio stored in the buffer,

and wherein the step of pausing further comprises pausing for a period of time based on the

5 amount of digitized audio remaining in the buffer.

32. The method of claim 25, wherein the pause information comprises at least one pause location within the digitized audio, and wherein the step of pausing further comprises:

10 identifying a pause location of the at least one pause location;

continuing provision of the reconstructed audio up to the pause location; and

pausing provision of the reconstructed audio once the pause location has been reached.

15 33. The method of claim 32, wherein the pause information comprises at least one pause type corresponding to the at least one pause location, wherein the step of identifying further comprises identifying the pause location based on a pause type corresponding to the pause location.

34. The method of claim 33, wherein the step of pausing further comprises pausing for a period of time based on the pause type.

20 35. The method of claim 33, wherein the at least one pause type comprises any of a group consisting of a word pause, a phrase pause, a sentence pause, a paragraph pause, a heading pause, a topic pause, a speaker pause and an end pause.

36. The method of claim 24, wherein the pause information comprises silence description
25 packets.

37. The method of claim 25, further comprising a step of:
providing filler audio while pausing the reconstructed audio.

38. A computer-readable medium having computer-executable instructions for performing the steps of claim 25.

39. An apparatus for marking pauses in digitized audio comprising:
means for identifying at least one pause location within the digitized audio; and
means for adding pause information to the digitized audio, wherein the pause information
indicates the at least one pause location within the digitized audio.

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40. The apparatus of claim 39, wherein the means for adding further functions to add, and the
pause information further comprises, at least one pause type corresponding to the at least one pause
location.

10 41. The apparatus of claim 40, wherein the at least one pause type comprises any of a group
consisting of a word pause, a phrase pause, a sentence pause, a paragraph pause, a heading pause, a
topic pause, a speaker pause and an end pause.

15 42. The apparatus of claim 39, wherein the pause information comprises silence description
packets.

43. The apparatus of claim 39, wherein the means for adding further functions to append the
pause information to the digitized audio.

20 44. The apparatus of claim 39, wherein the means for adding further functions intersperse the
pause information within the digitized audio.

45. The apparatus of claim 39, further comprising:
a packetizer, coupled to the means for adding, that divides the digitized audio and the pause
25 information into packets; and
a transmitter, coupled to the packetizer, that transmits the packets to a decoder.

46. An apparatus for marking pauses in digitized speech comprising:

a parser, that takes a text string as input and identifies pauses within the text string and that provides portions of the text string and pause information corresponding to the portions of the text stream as output;

5 a text-to-speech converter, coupled to the parser, that converts the portions of the text string to provide the digitized speech as output; and

a marker, coupled to the parser and the text-to-speech converter, that adds the pause information to the digitized speech.

10 47. The apparatus of claim 46, wherein pause information provided by the parser comprises at least one pause location.

48. The apparatus of claim 47, wherein the pause information provided by the parser comprises at least one pause type corresponding to the at least one pause location.

15 49. The apparatus of claim 46, further comprising:

a packetizer, coupled to the marker, that divides the digitized audio and the pause information into packets; and

a transmitter, coupled to the packetizer, that transmits the packets to a decoder.

50. An apparatus for marking pauses in digitized audio comprising:
an audio editor, that takes the digitized audio as input and identifies pauses within the
digitized audio and that provides the digitized audio and pause information corresponding to the
portions of the audio as output;

5 a marker, coupled to the audio editor, that adds the pause information to the digitized audio.

51. The apparatus of claim 50, wherein pause information provided by the audio editor comprises
at least one pause location.

10 52. The apparatus of claim 51, wherein the pause information provided by the audio editor
comprises at least one pause type corresponding to the at least one pause location.

15 53. The apparatus of claim 50, further comprising:
a packetizer, coupled to the marker, that divides the digitized audio and the pause information
into packets; and
a transmitter, coupled to the packetizer, that transmits the packets to a decoder.

54. An apparatus for marking pauses in digitized audio comprising:
a pause analyzer, that takes the digitized audio as input and identifies at least one period of silence longer than a predetermined length within the digitized audio and that provides the digitized audio and pause information corresponding to the portions of the audio as output;
5 a marker, coupled to the pause analyzer, that adds the pause information to the digitized audio.

55. The apparatus of claim 54, wherein pause information provided by the pause analyzer comprises at least one pause location corresponding to the at least one period of silence.

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56. The apparatus of claim 54, further comprising:
a packetizer, coupled to the marker, that divides the digitized audio and the pause information into packets; and
a transmitter, coupled to the packetizer, that transmits the packets to a decoder.

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57. An apparatus for decoding digitized audio, wherein pause information has been added to the digitized audio, the apparatus comprising:

a controller;

a receiver, coupled to the controller, that receives the digitized audio and the pause

5 information and that stores the digitized audio in an audio buffer;

an audio reconstructor, coupled to the controller and the audio buffer, that provides reconstructed audio based on the digitized audio stored in the audio buffer,

wherein the controller detects a condition requiring at least temporary discontinuation of the reconstructed audio and, in response to the condition, instructs the audio reconstructor to pause the

10 reconstructed audio based on the pause information.

58. The apparatus of claim 57, wherein the condition detected by the controller is an impairment to continued receipt of the digitized audio.

15 59. The apparatus of claim 57, further comprising:

a user interface coupled to the controller,

wherein the condition detected by the controller is a request to discontinue the reconstructed audio received via the user interface.

20 60. The apparatus of claim 57, wherein the controller instructs the audio reconstructor to pause for a predetermined period of time.

61. The apparatus of claim 60, wherein the pause information comprises at least one pause type, and length of the predetermined period of time is based on the at least one pause type.

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62. The apparatus of claim 57, wherein the controller instructs the audio reconstructor to pause for a period of time that is based on the amount of digitized audio remaining in the buffer.

63. The apparatus of claim 57, wherein the pause information comprises at least one pause location, and wherein the controller instructs the audio reconstructor to pause based on the at least one pause location.

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64. The apparatus of claim 57, wherein the pause information comprises at least one pause type corresponding to the at least one pause location, and wherein the controller instructs the audio reconstructor to pause based on the at least one pause type corresponding to the at least one pause location.

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65. The apparatus of claim 57, further comprising:
an audio fill generator, coupled to the controller and the audio reconstructor,
wherein the controller instructs the audio fill generator to provide filler audio to the audio reconstructor while pausing the reconstructed audio.

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66. A client in a client-server communication system comprising the apparatus of claim 57.
67. The client of claim 66, wherein the receiver is a wireless receiver.

68. A system for marking pauses in digitized audio comprising:
- a voice activity detector, that takes the digitized audio as input and identifies at least one period of silence longer than a predetermined length within the digitized audio;
 - an encoder that provides the digitized audio as output, and that provides silence description information as output when the voice activity detector identifies the at least one period of silence;
 - 5 a transmitter, coupled to the encoder, that transmits the digitized audio and the silence description information;
 - a receiver, in communication with the transmitter that receives the digitized audio and the silence description information from the transmitter;
 - 10 an audio reconstructor, coupled to the receiver, that provides reconstructed audio based on the digitized audio; and
 - 15 a controller, coupled to the receiver, that at least temporarily discontinues provision of the reconstructed audio and instructs the audio reconstructor to pause the reconstructed audio based on the silence description information.